DelDOT – Development Coordination

Traffic Generation Example

The following Traffic Generation Example is included as guidance to better understand the methodology for creating the Traffic Generation Diagram. Please note that DelDOT's Development Coordination Portal (https://www.deldot.gov/Business/subdivisions/index.shtml) provides worksheets and tools for determining various factors necessary to create a Trip Generation Diagram. These worksheets and tools are updated periodically which may cause inconsistencies with the example below.

Example Project:

A mixed use development is proposed on the southerly side of Old Coach Road between Upper Pike Creek Road and Delaware Route 2 in New Castle County. The development consists of 5,000 s.f. pad site for a bank, 10,000 s.f. retail, 60 townhouses and 150 apartment units. The site proposes two entrances on Old Coach Road.

- **Road Traffic Data:**

1. Functional Classification – Information from the latest DelDOT Traffic Volume Summary. https://www.deldot.gov/Publications/manuals/traffic_counts/
   N-316 Old Coach Road – Collector

2. Posted Speed – Actual posted speed from the roadway – Google Earth: **35 MPH**

3. AADT - Information from the latest DelDOT Traffic Volume Summary.
   5,880 Trips (From 2017 DelDOT Traffic Summary)

4. 10 Year Projected AADT = Current ADT x 10-Year Growth Factor. Apply the same 10-Year Growth Factor that is used in the DelDOT Auxiliary Lane Worksheet. Currently the growth factor is 1.16. The most up-to-date worksheet is located within DelDOT's Development Coordination Portal:
   https://www.deldot.gov/Business/subdivisions/index.shtml
   10 year AADT = 5,880 x 1.16 = **6,821 Trips**

5. Traffic Pattern Group - Information from the latest DelDOT Traffic Summary:
   https://www.deldot.gov/Publications/manuals/traffic_counts/
   TPG – 3

6. The Total ADT = 10 Year Projected ADT + Total ADT of the proposed development =
   6,821 + 3,303 = 10,124 Trips
   Calculation of Total ADT of the proposed development is detailed in the **Site Traffic Data** section below.

7. Design Hourly Volume = K x Total ADT. The K factor is from the latest DelDOT Traffic Summary. https://www.deldot.gov/Publications/manuals/traffic_counts/
   Design Hourly Volume = 10.32% x 10,124 = 1,045 Trips

- **Site Traffic Data:**

    1. Trip generation is based on the latest edition of the ITE Trip Generation Manual. Procedure to determine if rates and/or equations are to be used to calculate the trip generation for the proposed development is based on the guidance provided in the latest ITE Trip Generation Manual - Volume 1: User's Guide and Handbook. DelDOT's Planning and Development Coordination Application can be used to calculate the trip generation for the proposed development.

        i. 150 Apartment Units and 60 Townhouse Units - Use ITE 220 for Multifamily Housing (Low-Rise) – Use equation which results in **1,547 Trips**

        ii. 10,000 Retail, Gross Leasable Area, SF – Use ITE 820 for Shopping Center – Use equation which results in **1,256 Trips**

        iii. 5,000 Bank, Gross Floor Area, SF - Use ITE 912 for Drive-In Bank – Use average rate which results in **500 Trips**

    2. Number of entrances and corresponding configurations: **Two Entrances – Full Movement**

    3. Design Vehicle – Select a design vehicle that is likely to use the proposed development entrances with considerable frequency. **SU-30**

    4. Total ADT for Proposed Development - **3,303 Trips (1,652 Enter/1,651 Exit)**

    5. Directional Distribution: This distribution is based on engineering judgment which is based upon existing and /or future traffic patterns surrounding the development area. Details of determining peak hour volumes are located in the **Traffic Generation Diagram** section below. In this case **75% to and from the west and 25% to and from the east.**
    75% To and From the west = 2,477 ADT (115 AM PK) [237 PM PK]
    25% To and From the east = 826 ADT (39 AM PK) [78 PM PK]

    6. Percent of Trucks & Buses - The Truck % factor is from the latest DelDOT Traffic Volume Summary.

        Truck % factor = **5.79%.** The left turn ingress ADT at the entrances are **124 and 289 Trips, respectively.** Details of determining the left turn ingress ADT are located in the **Traffic Generation Diagram** section below. The left turn ingress ADT of trucks and buses = **5.79% x 124 = 7** at Proposed Entrance 1 and **5.79% x 289 = 17** at Proposed Entrance 2.

- **Traffic Generation Diagram:**

  Development generated trips should be assigned to the proposed entrances according to the actual development site plan as well as existing and/or future traffic patterns surrounding the development area.

  For the purpose of this sample, the directional distribution is 75% to and from the west and 25% to and from the east.

  For this example project, the roadway ADT traveling in each direction = 10 year projected roadway ADT/2 = 6,821/2 = 3,411.

  Site ADT to and from the west = ADT for Proposed Development x Percentage of Proposed Development to and from the west = 3,303 x 75% = 2,477.

  Site ADT to and from the east = ADT for Proposed Development x Percentage of Proposed Development to and from the east) = 3,303 x 25% = 826.

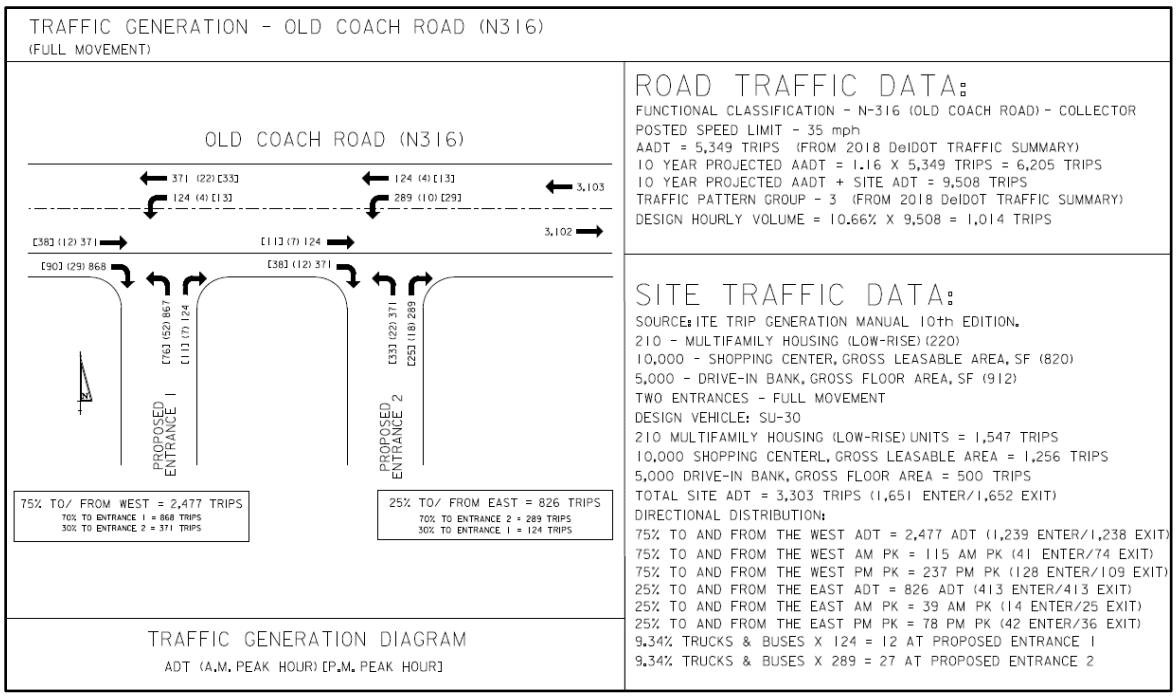
  AM and PM peak hours In and Out Trip distribution is based on the latest edition of the ITE Trip Generation Manual.

	AM Peak Hour			PM Peak Hour		
Land Use	Enter	Exit	Total	Enter	Exit	Total
210 Multifamily Housing Units	22	75	97	72	42	114
10,000 square foot Shopping Center	5	4	9	47	52	99
5,000 square foot Drive-In Bank	28	20	48	51	51	102
Total	55	99	154	170	145	315

  Additionally, the trips coming in and out of the development are assigned 70% for the first entrance passed and 30% for the second entrance passed. **For this example project, the AM site traffic from the west entering at Entrance 1 via a right turn = total AM entering x 75% x 70% = 55 x 75% x 70% = 29. The AM site traffic from the west entering at Entrance 2 via a right turn = total AM entering x 75% x 30% = 55 x 75% x 30% = 12.**

  The AM site traffic from the east entering at Entrance 2 via a left turn = total AM entering x 25% x 70% = 55 x 25% x 70% = 10. The AM site traffic from the east entering at Entrance 1 via a left turn = total AM entering x 25% x 30% = 55 x 25% x 30% = 4.

The same procedure should be done for the PM and ADT site traffic.



- **DelDOT Auxiliary Lane Worksheets**
  Since this example project has two proposed full access entrances, two DelDOT Auxiliary Lane worksheets need to be created.

  Complete the worksheets per below:

  1. Fill in the volumes on the **Traffic Generation Diagram** tab consistent with the Traffic Generation Diagram created for the Entrance Plan.

     i. If the proposed entrance will create the fourth leg to an existing entrance, separate Auxiliary Lane Worksheets shall be completed and submitted for review of both the proposed entrance and the existing entrance.

     ii. If the entrance is an existing access point, right turning ADT and peak hour volumes shall include site traffic and existing roadway traffic executing the right-turning movement.

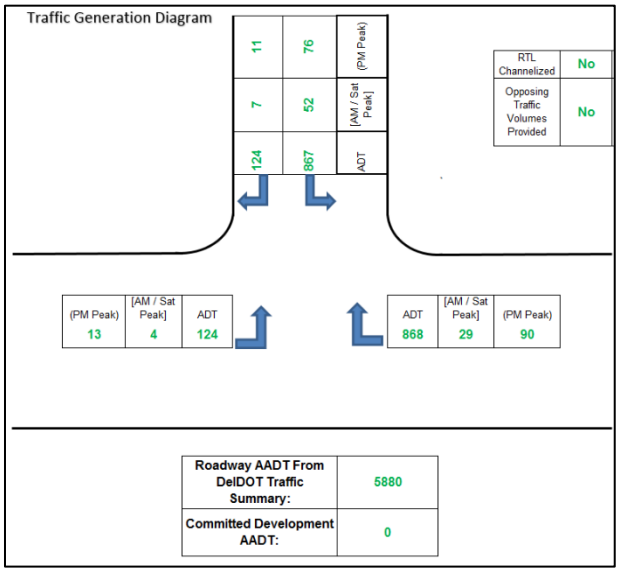
  2. If opposing roadway traffic volumes were collected, include in the worksheet.

  3. If the opposing right-turn movement is channelized, a reduction may be included in the worksheet. Justification for reduction shall be submitted to DelDOT Development Coordination Section for review.

  4. In the **User Inputs** tab, fill in the cells with green text.

     i. If opposing roadway traffic volumes were collected and/or the opposing right-turn movement is channelized, the Left Turn VPH should be the same peak hour as the peak hour chosen for the opposing through and right turn volumes within the **Traffic Generation Diagram** tab.

- **Creation of DelDOT Auxiliary Lane Worksheet for Proposed Entrance 1**



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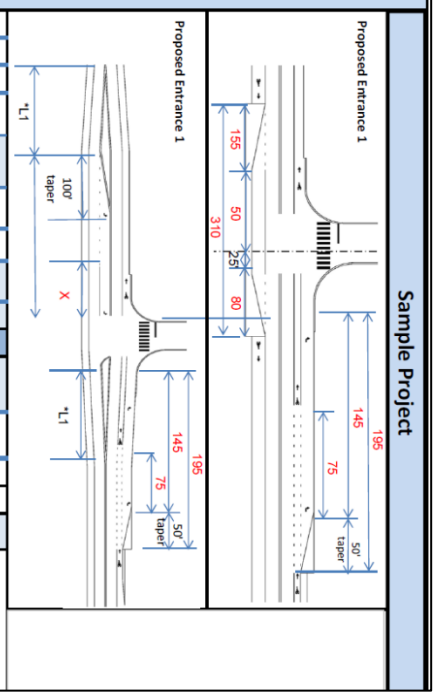
DelDOT Auxiliary Lane Worksheet

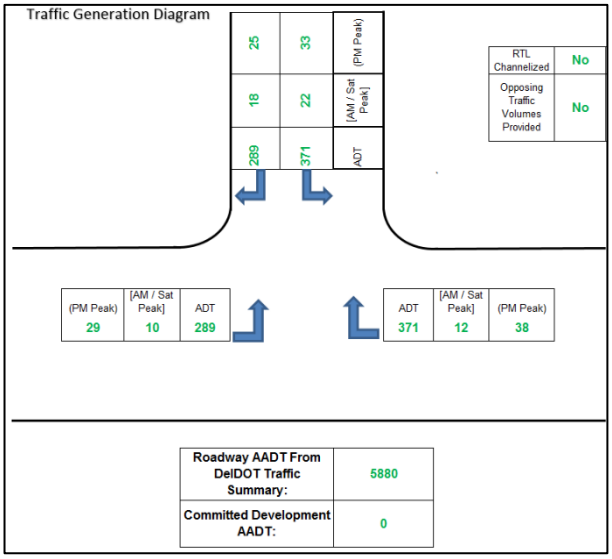
Roadway Information and Entrance

Name of Project	Sample Project	Date of Submittal	5/17/2019
Maintenance Road No. (i.e. K234A)	N316	Road Name	Old Coach Road
Signalized / Unsignalized	Unsignalized	Posted Speed Limit	35
Roadway ADT (From DelDOT Traffic Manual)	5880	Traffic Pattern Group	3
Left Turn Approach Site ADT: 248 / Committed Development ADT: 0	Total Left Approach ADT: 248	Right Turn Approach Site ADT: 1735 / Committed Development ADT: 0	Total Right Approach ADT: 1735
Total Number of Through Lanes (Does Not Include Turn Lanes)	2 lanes	Number of intersection legs	3
Roadway Functional Classification	Major Collector	Calculation for (specify leg)	Proposed Entrance 1
Left-Approach Projected 10 yr Roadway ADT + Total Site + Committed Development ADT	7068	Right-Approach Projected 10 yr Roadway ADT + Total Site + Committed Development ADT	8555
K Factor	10.32	D Factor	61.23

Left Turn Information		Right Turn Information	
Left Turn VPH	13	Right Turn ADT	Over 400
Left Turn Approach Grade	0.0%	Right Turn Approach Grade	0.0%
Heavy Vehicle %	5	Effective Radius of Entrance	R≤50'
10 Yr Opposing Vol. (Manual Input - Veh/hr)	0		
10 Yr Opposing Volume (Calculated)	431 Veh/hr	Right Turn Length	195 ft
10 Yr Opposing Volume (Calculated Vol.)	431 Veh/hr		
Bypass Lane Approach Taper	155 ft		
Bypass Lane Departure Taper	80 ft		
Bypass Lane Storage	75 ft		



- **Creation of DelDOT Auxiliary Lane Worksheet for Proposed Entrance 2**



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DelDOT Auxiliary Lane Worksheet

Roadway Information and Entrance

Name of Project	Sample Project	Date of Submittal	5/17/2019
Maintenance Road No. (i.e. K234A)	N316	Road Name	Old Coach Road
Signalized / Unsignalized	Unsignalized	Posted Speed Limit	35
Roadway ADT (From DelDOT Traffic Manual)	5880	Traffic Pattern Group	3
Left Turn Approach Site ADT: 578; Committed Development ADT: 0; Total Left Approach ADT: 578		Right Turn Approach Site ADT: 742; Committed Development ADT: 0; Total Right Approach ADT: 742	
Total Number of Through Lanes (Does Not Include Turn Lanes)	2 lanes	Number of intersection legs	3
Roadway Functional Classification	Major Collector	Calculation for (specify leg)	Proposed Entrance 2
Left-Approach Projected 10 yr Roadway ADT + Total Site + Committed Development ADT	7398	Right-Approach Projected 10 yr Roadway ADT + Total Site + Committed Development ADT	7562
K Factor	10.32	D Factor	61.23
Left Turn Information		**Right Turn Information**	
Left Turn VPH	29	Right Turn ADT	301 - 400
Left Turn Approach Grade	0.0%	Right Turn Approach Grade	0.0%
Heavy Vehicle %	5	Effective Radius of Entrance	R≤50'
10 Yr Opposing Vol. (Manual Input - Veh/hr)	0		
10 Yr Opposing Volume (Calculated)	431 Veh/hr	Right Turn Length	160 ft
10 Yr Opposing Volume (Calculated Vol.)	431 Veh/hr		
Left Turn Length	220 ft